

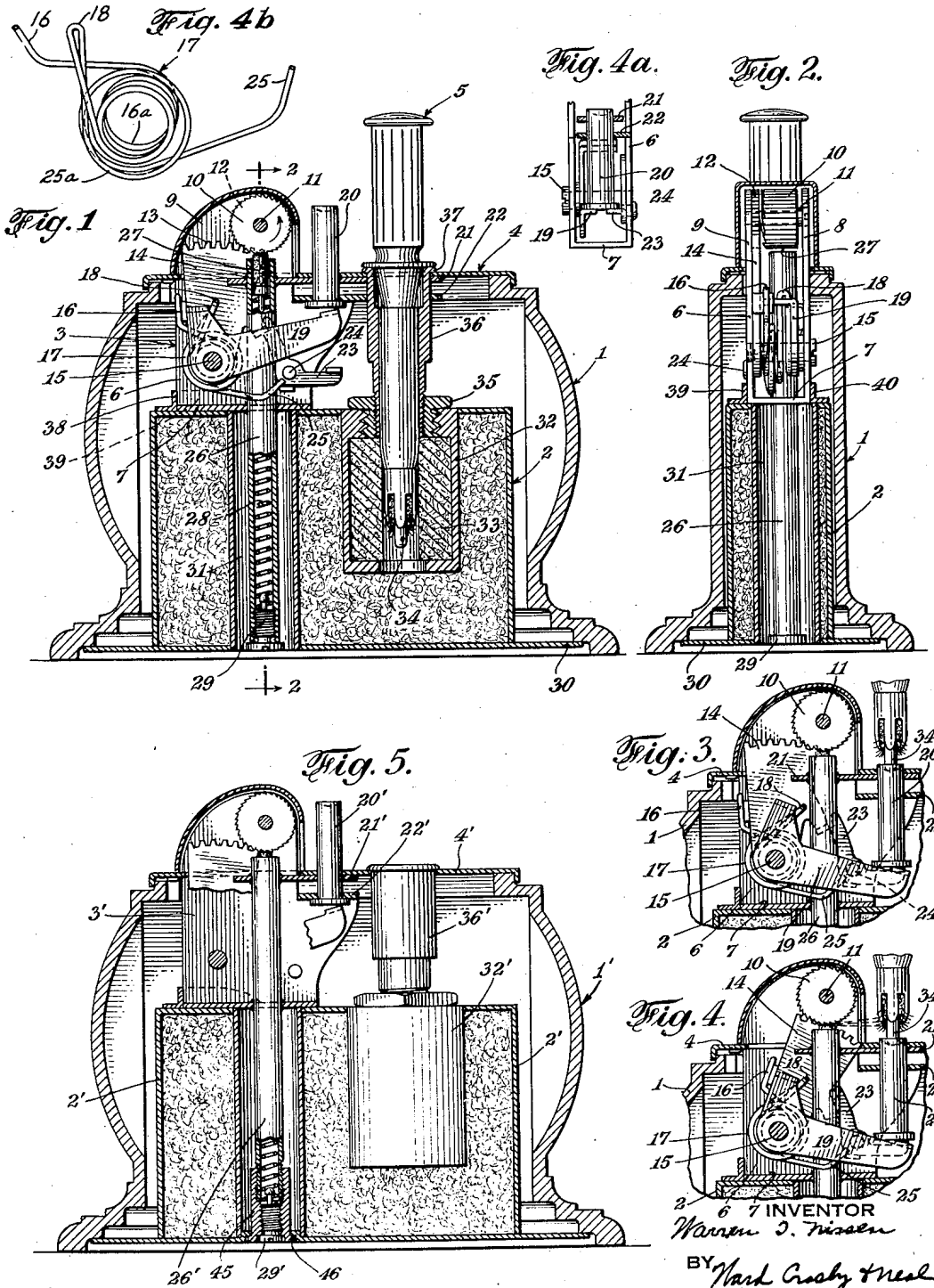
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PYROPHORIC LIGHTER

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PYROPHORIC LIGHTER

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This invention relates to pyrophoric lighter mechanisms of the type utilizing a removable torch which serves also as a contact piece for the actuating mechanism.

The invention has particular reference to improvements providing simplicity of construction, facility and economy in manufacture and assembly of the parts and also providing a rugged dependable mechanism.

Various other objects, advantages and features of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which—

Fig. 1 is a side elevational view, in section, showing a pyrophoric lighter embodying the invention;

Fig. 2 is a sectional view taken along the line 2-2 of Fig. 1;

Figs. 3 and 4 are partial views of the mechanism shown in Fig. 1 but with the operating parts shown in intermediate positions during the operating cycle;

Fig. 4a is a front elevational view of certain parts of the mechanism shown in Figs. 3 and 4;

Fig. 4b is an enlarged side elevational view partly in perspective further illustrating the three-legged spring shown in Figs. 1-4 inclusive; and

Fig. 5 is a view similar to Fig. 1 but showing certain modifications and with certain parts of the device omitted for purposes of clarity.

Referring to the drawings and more particularly to Figs. 1 and 2; the embodiment illustrated comprises a casing or shell portion 1 in which is positioned a body or tank designated in general as 2 and providing a reservoir for the fuel, a unitary spark-producing mechanism designated in general as 3, a cover plate designated in general as 4 and a removable torch designated in general as 5. Since the unitary pyrophoric mechanism 3 and its cooperative relationship with the remaining parts are salient features of the invention this unit will now be described.

Spark-producing unit

The unit 3 comprises a main frame which provides a rigid mounting for the operating parts so that the entire unit assemblage 3 is a self-contained unit. The main frame member in the present embodiment comprises a U-shaped member 6 provided with a flattened base portion 7 and upwardly extending side arms 8-9 which carry adjacent their upper ends a suitable abra-

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dent wheel 10 disposed therebetween and mounted for rotation about a pivot pin 11. The wheel is rotated in an anti-clockwise direction by a pinion 12 and a suitable one-way clutch mechanism interposed between the pinion 12 and gear 10 in the usual manner. The pinion 12, in turn, is in driven engagement with gear teeth 13 provided on the upper end of the gear segment 14 which is pivotally journaled about a pin 15 supported in the side arms of the frame member 6. This segment 14 is engaged at its rear by an end 16 of a power spring 17 which is also provided with another end 18 whose rear face is engaged by one end of an actuating lever 19 journaled on the pivot 15 and whose forward end extends inwardly (see also Fig. 4a) and is freely disposed beneath an actuating plunger 20 which is freely slidably guided in holes provided in the vertically spaced horizontal frame plates or arms 21-22 which are integral with the U member 6. The three-legged spring 17 is shown in enlarged view in Fig. 4b, from which it will be more clearly seen that the end 16 is the rearwardly extending end of a helical coil 16a whose other end also extends upwardly and rearwardly where it is sharply looped to provide the spring end 18 and then continues downwardly where it forms the continuation of a larger helical coil 25a of slightly more than one complete loop provided with a free forwardly and upwardly extending end 25. A trigger 23 is suitably pivotally journaled on the U member 6 for movement about a pivot 24. The upper end of the trigger 23 is disposed for cooperative locking engagement with the segment 14 (Fig. 3), and is biased into such engagement by the portion 25 of the spring 17, and the opposite or forwardly extending end of the trigger 23 extends inwardly toward but spaced from the inwardly extending end of lever 19 and is likewise disposed in the path of downward movement of the actuating plunger 20 so as to be actuated thereby; all in the manner and for the purpose to be more particularly pointed out hereinafter under operation.

A tube 26 passes through the base 7 of the U member 6 and through the inner end of the upper horizontal plate 21 and is rigidly secured, as by welding, to these two members so as to form an integral part of the frame structure. The upper end of the tube 26 is disposed immediately beneath the abrader wheel 10 so as to hold a piece of pyrophoric metal such as 27 in cooperative position thereagainst, and said metal is adapted to be urged against said wheel by a suitable compression spring 28 whose lower

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end is engaged by screw 29 which is threadingly engaged interiorly of the tube 27.

Body

The body 2 comprises the tank or reservoir for holding the lighter fluid and in the present embodiment is provided with a bottom flange 30 providing a base portion for engaging the shell housing 1 adjacent its lower end. The tank is provided with a passage 31 extending there-through for receiving the tube 26. The tank is further provided with a suitable compartment or cage 32 for holding a felt sleeve or reservoir wick 33, in the manner well known to those skilled in the art, to the end that fuel within the tank 2 passes from the cotton or the like fibrous material 34, which is contained in said tank, through the opening of the bottom of cage 32 and into the felt member 33 from which it is picked up by the wick of torch 5 in the manner well understood in the art. The receptacle or cage 32 carries suitably secured in the upper end thereof a bushing 35 so that the bushing is a rigid part of the tank 2. The bushing 35 is interiorly threaded to receive the lower threaded end of a tubular member or sleeve 36 whose upper end is provided with an exterior flange 37 so spaced from the lower threaded end as to hold the shell or casing 1 clamped between the cover plate 4 and the tank flange 30. The sleeve 36 passes freely through registered openings provided in the frame plates or arms 21—22 of unit 3, to assist in the alignment of the unit with respect to the tank. To further assist in properly registering unit 3 with respect to the tank 2 and holding the parts in alignment, the top of the tank is provided with a three-sided socket or saddle comprising an end plate 38 (Fig. 1) and side plates 39—40.

Assembly

From the foregoing it will be seen that with the individual parts constructed as above described the complete lighter may be readily assembled as follows:

The tube 26 of the unit 3 is inserted within the well or passage 31 and the base 7 of the unit frame is seated within the cooperating centering flanges 38—39—40. The cover plate 4 is then inserted over the unit 3 with the engageable portion 20 extending through the cover plate. The sleeve 36 is then inserted through a suitable opening in the cover plate 4 and through the registered holes in the frame members 21—22, and its lower end is then threaded into the tank bushing 35. This simultaneously clamps the cover plate against the casing 1 and draws the tank flange 30 up against the bottom of the casing 1 and holds the unit 3 firmly seated on the top of the tank 2. The torch 5 is then inserted within the sleeve 36 so that its lower end is operatively disposed within the felt member 33.

Operation

With the parts arranged as above described the device is operated by withdrawing the torch 5 and engaging its lower end or pin within the upper recessed end of the actuating plunger 20 and pressing down on said plunger. This causes the plunger to move the actuating lever 19 in a clockwise direction (Fig. 3) which moves the spring end 18 in a clockwise direction causing the spring to be tensioned against the segment 14; the segment at this time being anchored or locked in inactive position by the trigger 23. As the plunger 20 reaches the lower end of its

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stroke the free forward end of the trigger 23 is also engaged by the plunger 20 (Figs. 4 and 4a) to rotate it in a clockwise direction against the action of the spring end 25 and thereby causing it to release the segment 14 (Fig. 4); thus causing the energy stored in the spring 17 to be released to drive the segment 14 in a clockwise direction and thereby to cause the rotation of the wheel 10 in an anti-clockwise direction. Sparks from the pyrophoric metal piece 27 are thereby ejected forwardly against the wick on the lower end of the torch 5 to cause the fuel carried thereby to be ignited. Upon raising the torch and releasing pressure from the upper end of actuating plug 20 the plug is returned to neutral position by the adjacent end of lever 19 which is rotated in an anti-clockwise direction by the spring 17. The trigger 23, driving segment 14 and pinion 12 and associated ratchet clutch are likewise returned to normal position. It will therefore be seen that by the arrangement and construction above described a single spring serves as a means for storing energy to drive the sparking wheel and for returning the parts, including the actuating plunger 20, to normal or inactive position; thus greatly simplifying and reducing the cost of manufacture and assembly, as well as enhancing the serviceability of the mechanism.

Modification

A further advantage of the unitary spark-producing mechanism resides in its adaptation to different variations of lighters and arrangements of parts. For example, in the device shown in Fig. 1 (as in the usual lighters of this type) the recess for the torch 5 bears a fixed angular relationship to the plunger 20 because the sleeve 36 passes through a fixed part of the lighter mechanism, such as the horizontal arms 21—22. However, in view of the location of these arms and the manner of mounting of the unit 3 directly upon the tank 2 the same unit is easily modified in the manner shown in Fig. 5 to adapt it to different environments. In this modified form the unit 3' is identical with that heretofore described except for the differences now to be described. The outer ends of the arms 21—22 terminate just beyond the plunger 20' so that these arms do not fix the angular relationship between the plunger 20' and the sleeve 36' for receiving the torch. The different angular relationship being shown by the offset position of the sleeve 36' and cage 32' as indicated by the side elevation of these parts. A further distinction is that the lower end of tube 26' is exteriorly threaded and engages the inner threaded end of a bushing 45 whose outer end is interiorly threaded to receive the screw 29'. The outer end of bushing 45 being provided with a head 46 engaged within a recess in the lower face of the tank. It will thus be seen that the unit 3' is centered in position on the tank 2' by means of the bushing 45 and by tightening up the bushing 45 the tube 26' acts as a tension member to hold the unit 3' in seated engagement with the top of the tank 2', entirely independent of the sleeve 36' which serves to separately hold the cover 4' and casing 1' to the tank 2'.

Having thus described the invention with particularity with reference to certain preferred forms, it will be understood by those skilled in the art after understanding the invention that changes and modifications may be made therein without departing from the spirit and scope of the invention and it is intended in the appended

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claims to cover all such changes and modifications.

What I claim is:

1. In a pyrophoric lighter the combination of a body providing a fuel reservoir, a unitary assemblage spark-producing mechanism having a base seated on and supported by said body, said assemblage and body being provided with cooperating portions in interfitting engagement holding said parts in angular register, said unitary assemblage also comprising a tubular holder for pyrophoric metal and extending downwardly through said body, a bushing nut screw-threaded onto the lower end of said holder and clamping said reservoir body and unit assemblage together, a casing, a cover plate for said casing, and a tension member holding said cover plate in position on said casing.

2. A unitary pyrophoric spark-producing mechanism, for use in a lighter of the touch tip type, comprising a supporting frame, an abradent wheel rotatably mounted on said frame, a holder adapted to urge a piece of pyrophoric metal against said wheel, a power spring having one leg rotating said wheel, a drive train connecting said spring and wheel, a lever for storing energy in said spring, a trigger for controlling the release of said energy, and a reciprocal plunger freely slidably journaled in said frame and disposed in operative non-yielding engagement with said lever for effecting the working stroke of said wheel rotating parts, said power spring having a second leg providing the restoring force for effecting the return stroke of said lever and the return of said plunger to neutral position.

3. A unitary pyrophoric spark-producing mechanism, for use in a lighter of the touch tip type, comprising a supporting frame, an abradent wheel rotatably mounted on said frame, a holder adapted to urge a piece of pyrophoric metal against said wheel, a power spring having one leg for rotating said wheel, a drive train connecting said spring and wheel, a lever for storing energy in said spring, a trigger for controlling the release of said energy, and a reciprocal plunger freely slidably journaled in said frame and disposed in operative engagement with said lever for effecting the working stroke of said wheel rotating parts, said power spring having a second leg providing the sole restoring force for effecting the return of said lever and plunger to neutral position and a third leg providing the sole restoring force for effecting the return of said trigger to neutral position.

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4. A unitary pyrophoric spark-producing mechanism, for use in a lighter of the touch tip type, comprising a supporting frame, an abradent wheel rotatably journaled near the top of said frame, a holder adapted to urge a piece of pyrophoric metal against said wheel, a three-legged power spring providing one leg for rotating said wheel, a drive train connecting said spring and wheel, a lever in engagement with a second leg of said spring for storing energy in said spring, a trigger for controlling the release of said energy and engaged by the third leg of said spring, and a reciprocal plunger freely slidably journaled in said frame and disposed in operative engagement with said lever for effecting the working stroke of said wheel rotating parts, said power spring being constructed and arranged to provide the sole restoring force for effecting the return stroke of said parts.

5. Pyrophoric spark-producing mechanism comprising a supporting frame, an abradent wheel rotatably mounted on said frame, a holder adapted to urge a piece of pyrophoric metal against said wheel, a three-legged power spring providing one leg for rotating said wheel, a drive train connecting said spring and wheel, a lever engaging a second leg of said spring for storing energy in said spring, a portion of said spring between said first and second legs being interposed between said lever and said drive train, a trigger for controlling the release of said energy and engaged by the third leg of said spring, and a reciprocal plunger disposed for direct engagement with said lever for effecting the working stroke of said parts, said power spring being constructed and arranged to provide the sole restoring force for effecting the return stroke of said drive train, said lever, said trigger and said plunger to neutral position.

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